

WHAT IS CLAIMED IS:

1 1. A negative electrode for a lithium secondary battery
2 prepared by forming an active material layer comprising active
3 material particles of silicon and/or a silicon alloy and a binder
4 on a current collector comprising an electrically conductive metal
5 foil, and sintering the active material layer on the current
6 collector under a non-oxidizing atmosphere, wherein said active
7 material particles are primary particles having a mean diameter of
8 not greater than 1 μm , the primary particles are dispersed
9 uniformly in the active material layer, and the primary particles
10 and the binder are uniformly mixed and distributed.

1 2. The negative electrode according to claim 1, wherein the
2 active material is silicon.

1 3. The negative electrode according to claim 1, wherein a
2 surface roughness (Ra) of a surface of the current collector is at
3 least 0.2 μm .

1 4. The negative electrode according to claim 2, wherein a
2 surface roughness (Ra) of a surface of the current collector is at

3 least 0.2 μm .

1 5. The negative electrode according to claim 1, wherein the
2 current collector is a copper foil, a copper alloy foil or a metal
3 foil having a copper layer or a copper alloy layer on a surface
4 thereof.

1 6. The negative electrode according to claim 1, wherein the
2 current collector is an electrolytic copper foil, an electrolytic
3 copper alloy foil or a metal foil having an electrolytic copper
4 layer or an electrolytic copper alloy layer on a surface thereof.

1 7. The negative electrode according to claim 1, wherein the
2 binder remains after sintering.

1 8. The negative electrode according to claim 1, wherein the
2 binder is polyimide.

1 9. The negative electrode according to claim 1, wherein an
2 electrically-conductive powder is mixed in the active material
3 layer.

1 10. The negative electrode according to claim 1, wherein the
2 active material is silicon, a surface roughness (Ra) of a surface
3 of the current collector is at least 0.2 μm , the current collector
4 is an electrolytic copper foil, an electrolytic copper alloy foil
5 or a metal foil having an electrolytic copper layer or an
6 electrolytic copper alloy layer on the surface, the binder remains
7 after sintering, and the binder is polyimide.

1 11. A method for preparing a negative electrode for a lithium
2 secondary battery comprising

3 preparing a slurry comprising an active material in a binder
4 solution, wherein the active material comprises silicon and/or a
5 silicon alloy having an average diameter of primary particles of
6 less than 1 μm and which is broken apart into the primary particles
7 in the binder solution;

8 coating the slurry on a current collector comprising a metal
9 foil to form an active material layer; and

10 sintering the active material layer on the current collector
11 under a non-oxidizing atmosphere.

1 12. The method for preparing a negative electrode according
2 to claim 11, wherein sintering is performed under conditions such

3 that the binder remains after heat treatment.

1 13. The method for preparing a negative electrode according
2 to claim 11, wherein the active material layer is press rolled
3 together with the current collector before sintering.

1 14. The method for preparing a negative electrode according
2 to claim 12, wherein the active material layer is press rolled
3 together with the current collector before sintering.

1 15. A lithium secondary battery comprising: a negative
2 electrode according to any one of claims 1 to 10, a positive
3 electrode comprising a positive electrode active material, and a
4 nonaqueous electrolyte.

1 16. A lithium secondary battery comprising: a negative
2 electrode prepared by a method according to any one of claims 11 to
3 14, a positive electrode comprising a positive electrode active
4 material, and a nonaqueous electrolyte.